APPENDIX 1: PARAMETER DICTIONARY

This file is the parameter dictionary for the toolkit. It describes the variables and data structures used in the TSDIS toolkit. It also lists the valid values for the parameters, when applicable.

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Defined constants

These are accepted values of the dataType parameter in TKopen.
Each value corresponds to a given algorithm.

Name

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TK_RADAR_STATE
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TK_VAL_NET_NAME
TK_NUM_VAL_SENSORS
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TK_RADAR_SPACING_Z
TK_RADAR_GRID_SIZE_X
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TK_RADAR_GRID_SIZE_Z
TK_UTCF_FLAG

Define maximum file name length, and number of characters needed
for specification of Algorithm ID metadata
TK_FNAME_LEN 255
TK_ALGID_LEN 4

Modes for TKopen

TK_READ_ONLY	Opens the file for read only access.
TK_NEW_FILE	Opens the file for write only access and initializes the metadata with default values.

General Return Status
TK_SUCCESS
TK_FAIL

Type of Offsets for TKseek

TK_REL_SCAN_OFF	Indicates that the parameter 'offset' in TKseek represents the relative number of scans from the current position.
TK_ABS_SCAN_OFF	Indicates that the parameter 'offset' represents the absolute number of scans from the beginning of the file.

Errors Codes

Routine	Error Name	Description
TKclose	E_TK_FAILDLGHEL	Deleting sGranuleHandle from error list failed.
	E_TK_FAILVINCLS	Inserting a vdata object failed in TKclose.
	E_TK_FAILSREFCLS	Obtaining SDS reference # failed in TKclose.
	E_TK_FAILSINCLS	Inserting a sds object failed in TKclose.
TKopen	E_TK_BADPIDOPEN	Undefined productID in TKopen.
	E_TK_BADGIDOPEN	Incorrect granuleID mode in TKopen.
	E_TK_FAILHDFOPEN	Opening a HDF file failed in TKopen.
	E_TK_BADDEFVG	Trouble with defining Vgroup in Tkopen.
	E_TK_FAILADGHEL	Adding sGranuleHandle to error list failed.
TKreadlsm	E_TK_LSBNDS	Index out of bounds in Land Sea array.
TKreadScan	E_TK_BADPIDRS	Invalid ProductID in TKreadScan.
	E_TK_BADREADFMODE	Invalid file mode in TKreadScan.
TKseek	E_TK_BADTYPSK	Undefined type in TKseek.
TKwriteScan	E_TK_BADPIDWS	Invalid ProductID in TKwriteScan.
	E_TK_BADWRITEFMODE	Invalid file mode in TKwriteScan.

Warnings Codes

Routine	Error Name	Description
TKclose	W_TK_FAILENDACCSCLS	SDendaccess failed in TKclose.
	W_TK_FAILENDCLS	SDend failed in TKclose.
	W_TK_FAILCLS	Hclose failed in TKclose.
TKseek	W_TK_BADOFSET	Invalid offset in TKseek.
	W_TK_FAILVSSK	VSseek failed in TKseek.

IO Structures defined in IO.h

CORE_METADATA

Name	Format	Description
orbitNumber	18-byte char	The orbit number to be used in calculating the spatial extent of this data.
tempRangeType	40-byte char	This tells the system how temporal coverage for the granule is specified.
beginDate	26-byte char	The data when the granule coverage began.
beginTime	24-byte char	The tiem when the granule coverage began.
endDate	23-byte char	The date when the granule coverage ended.
endTime	21-byte char	The time when the granule coverage ended.

PS_METADATA

Name	Format	Description
missingData	51-byte char	Number of missing scans (satellite data), missing rays (ground radar data), or missing observations (rain gauge or disdrometer data) expressed in percent.
percentBadMissPix	51-byte char	List by channel, the percentage of bad or missing pixels.
maxValidChannel	51-byte char	List by channel of the maximum valid value (value specified by the instrument scientist).
minValidChannel	51-byte char	List by channel of the minimum valid value (specified by instrument scientist)
orbitSize	51-byte char	Number of scans in an orbit.
radarWavelength	51-byte char	Wavelength of the radar in cm.
onewayBeamwidth	51-byte char	Moved to POWERS structure.

radarRangeRes	51-byte char	Not currently used.
minRefThreshold	51-byte char	The threshold (dBz) below which reflectivity data is set to the missing value.
algorithmID	6-byte char	The algorithm ID.
qualityIndCmt	101-byte char	A post processing comment by the algorithm devloper to accompany the Quality Indicator.
dataAccuracy	51-byte char	List by channel, the accuracies of the data.
dataGap	51-byte char	Lat/lon or time span of data gap.
inputFiles	301-byte char	List of input files.
dateGenInputFile	101-byte char	List of generation dates of the input files. For ingetsted file, the data will reflect when the data was received.
dataCenterSrc	51-byte char	List of data centers generating the input files, e.g., TSDIS, NMC.
generationDate	51-byte char	Dat the dataset was generated.
dayNight	51-byte char	Percentage of scans in daytime mode.
meanMotion	51-byte char	Number of orbits/day
orbitAdjFlag	51-byte char	Values are: 0 = no burns, non-zero = UTC seconds of day when burn occured.
attitudeMode	51-byte char	Values are: 0 = forward, 1 = backward, 2 = yaw maneuver during this granule, 3 = thruster burn during this granule.
beginSolarBeta	51-byte char	Elevation of sun in the orbit plane at the orbit start.
endSolarBeta	51-byte char	Elevation of the sun in the orbit plane at the orbit end.
scnrAlgnCal	51-byte char	Scanner Antenna Beam Alignment and Calibration Parameters.

		Relative offsets in alignment listed by channel.
ephemFilename	51-byte char	Ephem file name: YYYYDDDV, where YYYY=year, DDD=Day of year, V=version. Normally, V1, but if an elphemeris file is found to be invalid, and recreated,the version would be incremented by 1.
firstScanUTCdate	51-byte char	Orbit First Scan UTC Date in format described as YYYY/MM/DD
firstScanUTCtime	51-byte char	Orbit first scan UTC time in format HH:MM:SS.
firstScanUTCmsec	51-byte char	Orbit first scan UTC milliseconds.
firstScanSCsec	51-byte char	Seconds field of the s/c clock time of the first scan in the orbit.
firstScanSCsubsec	51-byte char	Subseconds field of the s/c clock time of the first scan in the orbit.
lastScanUTCdate	51-byte char	Orbit Last Scan UTC Date in YYYY/MM/DD
lastScanUTCtime	51-byte char	Orbit Last Scan UTC time in HH:MM:SS
lastScanUTCmsec	51-byte char	Orbit Last scan UTC milliseconds
lastScanSCsec	51-byte char	Seconds field of the spacecraft clock time of the last scan in the orbit.
lastScanSCsubsec	51-byte char	subseconds field of the last s/c clock time of the last scan in the orbit.
utcfSec	51-byte char	The seconds field of the UTCF for the granule.
utcfSubsec	51-byte char	The subseconds field of the UTCF for the granule
utcfFlag	51-byte char	Flag that indicates the orgin of the UTCF. 0=UTCF was derived from first ACS packet in the orbit. 1=a corrected UTCF was used.
leapSecsFlag	51-byte char	Flag that indicates ifa leap second occurred within the

		granule. 0=no, 1=yes.
prRainThreshold	51-byte char	The two thresholds about which rain is considered likely and certain, respecively.
radarName	51-byte char	Name of the GV radar or radar site, whichever is applicable.
radarCity	51-byte char	Nearest city to the radar site.
radarState	51-byte char	State or province containing the radar site, if applicable.
radarCountry	51-byte char	Country containing the radar site.
numVOS	51-byte char	Number of volume scans (times) in this granule.
valNetName	51-byte char	The name of the rain gauge or disdrometer network (e.g., Southwest Florida).
numValSensors	51-byte char	Number of validation sensors.
radarOriginLat	51-byte char	Latitude (degrees) of the origin.
radarOriginLon	51-byte char	Longitude (degrees) of the origin.
radarOriginAlt	51-byte char	Altitude (km) of the origin.
radarSpacingX	51-byte char	The zonal interval (km) between grid points.
radarSpacingY	51-byte char	the meridional interval (km) between grid points.
radarSpacingZ	51-byte char	The vertical interval (km) between grid points.
radarGridSizeX	51-byte char	The number of grid points in the zonal grid direction.
radarGridSizeY	51-byte char	The number of grid points in the meridional grid direction.
radarGridSizeZ	51-byte char	The number of grid points in the vertical direction.

GRANULE_ID

GRANULE_ID is a structure which is used to initialize IO_HANDLE when TKopen is called.

Name	Format	Description
dataFileName	50-byte character	File where the data is stored.
productID	1-byte integer	The product which is being analyzed. Valid productIDs can be found in the section "Defined Constant."
numberOf-Scanlines	1-byte integer	The number of scan lines to be analyzed.
mode	1-byte character	The mode of operation. Values ------ r - Read the file specified by dataFilename. w - Write to the file specified by dataFilename.

WRAPPER_HANDLE

WRAPPER_HANDLE is a structure used to send IO_HANDLE information to Fortran interface.

Name	Format	Description
cfgSTR	4-byte integer	Contains the structure of the results of parsing the configuration file.
vfile	4-byte integer	File identifier returned from Hopen if successful and TK_FAIL otherwise.
sdfile	4-byte integer	"sd_id" retuned from SDstart if successful and TK_FAIL otherwise.
rootVgroupID	4-byte integer	A Vdata identifier returned from VSattach if successful and TK_FAIL otherwise.
productID	1-byte integer	The product which is being analyzed. Valid productIDs can be found in the section "Defined Constant."
currNumofScan1	4-byte integer	The number of scans to be analyzed.

mode	1-byte character	The mode of operation. Values ------ r - Read the file specified by the sdFile. w - Write to the file specified by sdFile.

IO_HANDLE

IO_HANDLE is a structure to handle input, output, and HDF pointers. HDF pointers are stored in cfgSTR.

Name	Format	Description
cfgSTR	CFG_STR	Contains the structure of the results of parsing the configuration file.
productID	1-byte integer	The product which is being analyzed. Valid productIDs can be found in the section "Defined Constant."
currNumofScan	1 4-byte integer	The number of scans to be analyzed.
vfile	4-byte integer	File identifier returned from Hopen if successful and FAIL(-1) otherwise.
sdfile	4-byte integer	"sd_id" retuned from SDstart if successful and FAIL(-1) otherwise.
rootVgroupID	4-byte integer	A Vdata identifier returned from VSattach if successful and FAIL(-1) otherwise.
mode	1-byte character	The mode of operation. Values ------ r - Read the file specified by the vFile. w - Write to the file specified by vFile.

GRIDSTRUCT

GRIDSTRUCT is a structure which used to store information for Level 3 Grid Structure.

Name	Estimated Size	Description
binmeth	51-byte	Method used to obtain the value

	character	in the bin. For example, a simple average would have value "ARITHMEAN".
registration	51-byte character	Representative location within the bin. For example, it the center of the the bin is the most representative location, the values "CENTER" would be used. Currently no other values have been defined.
latResol	51-byte character	Norht-south size of a bin (degrees latitude).
lonResol	51-byte character	East-west size of a bin (degrees longitude).
northBCor	51-byte character	Northern-most latitude (degrees) covered by the grid.
southBCor	51-byte character	Southern-most latitude (degrees) covered by the grid.
westBCor	51-byte character	Western-most longitude (degrees) covered by the grid.
eastBCor	51-byte character	Eastern-most longitude (degrees) covered by the grid.
origin	101-byte character	Origin of the grid indices. For example, "SOUTHWEST".

NAVIGATION

NAVIGATION structure is the common block that used by the L1 and L2 satellite products.

Name	Format	Description
scPosX	4-byte float	The x coordinate position (km) of the spacecraft in Geocentric Inertial Coordinates at the Scan Time.
scPosY	4-byte float	The y coordinate position (km) of the spacedraft in Geocentric Inertial Coordinates at the Scan Time.
scPosZ	4-byte float	The z coordinate position (km) of the spacecraft in Geocentric Inertial Coordinates at the Scan Time.

scVelX 4-byte float — The x velocity (ms^-1) fo the spacecraft in Geocentric Inertial Coordinates at the Scan Time.

scVelY 4-byte float — The y velocity (ms^-1) of the spacecraft in Geocentric Inertial Coordinates at the Scan Time.

scVelZ 4-byte float — The z velocity (ms^-1) of the spacecraft in Geocentric Inertial Coordinates at the Scan Time.

scLat 4-byte float — The latitude (decimal degrees) of the spacecraft at the Scan Time.

scLon 4-byte float — The longitude (decimal degrees) of the spacecraft at the Scan Time.

scAlt 4-byte float — The altitude (km) of the spacecraft above the geoid at the Scan time.

scAttRoll 4-byte float — The satellite roll angle in degrees relative to Geodetic Coordinates at the Scan Time.

scAttPitch 4-byte float — The satellite pitch angle in degrees relative to Geodetic Coordinates at the Scan Time.

scAttYaw 4-byte float — The satellite yaw angle in degrees relative to Geodetic Coordinates at the Scan Time.

att1 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 1.

att2 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 2.

att3 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 3.

att4 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 4.

att5 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 5.

att6 4-byte float — The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 6.

att7	4-byte float	The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 7.
att8	4-byte float	The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 8.
att9	4-byte float	The rotation matrix from the instrument coordinate frame to Geocentric Inertial Coordinates. Element 9.
greenHourAng	4-byte float	The rotation angle (degrees) from Geocentric Inertial Coordinates to Earth Fixed Coordinates.

DATE_STR

Name	Format	Description
tkyear	2-byte integer	
tkmonth	2-byte integer	
tkday	2-byte integer	

TIME_STR

Name	Format	Description
hour	1-byte integer	The UTC hour-of-day for the start of one volume scan.
minute	1-byte integer	The UTC minute-of-hour for the start of one volume scan.
second	1-byte integer	The UTC seconds-of-minute for the start of one volume scan.

PR
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PR_CAL_COEF

Name	Format	Description
transCoef	4-byte float	Transmission coefficients for the PR (1 record)
receptCoef	4-byte float	Reception coefficients for the PR (1 record)
fcifIOchar	4-byte float	FCIF I/O Characteristics (16 records)

The above Descriptions are to be decided by NASDA

RAY_HEADER

Name	Format	Description
rayStart	2-byte integer	Range bin number of starting sample
raySize	2-byte integer	Number of the samples in the ray
angle	4-byte float	Angle of ray from Nadir.The sign of angle is consistent with the sensor y-axis,i.e., the angle is positive to the right of the direction of travel if the spacecraft is in normal mode.
startBinDist	4-byte float	Distance(m) between the satellite and the starting sample.
rainThres1	4-byte float	To be determined by NASDA
rainThres2	4-byte float	To be determined by NASDA
transAntenna	4-byte float	Spaceborne transmitted radar antenna effectiveness(dB).
recvAntenna	4-byte float	Spaceborne received radar antenna effectiveness(dB).

onewayAlongTrack	4-byte float	Radar beamwidth(radians) at the point transmitted power reaches one half of peak power in the along track direction.
onewayCrossTrack	4-byte float	Radar beamwidth(radians) at the point transmitted power reaches one half of peak power along the cross-track.
eqvWavelength compression(dB).	4-byte float	Equivalent wavelength due to pulse
radarConst	4-byte float	Radar constant dC(units are dB) in the following equation dC = 30log(pi) - 10log(2^10 * ln2) + 10log(|K|^2) - 180 where K = (epsilon -1)/(epsilon + 2). epsilon is the dielectric constant of water.
prIntrDelay	4-byte float	Units are in seconds. Description are To be described by NASDA.
rangeBinSize	4-byte float	The distance(m) between bins. (125m)
logAveOffset	4-byte float	Units are in dB. (2.5dB). Description are to be described by NASDA.
mainlobeEdge	1-byte integer	Absolute value of the difference in Range Bin Numbers between the detected surface and the edge of the clutter from the mainlobe.
sidelobeRange	3x1-byte integer	Absolute value of the difference in Range Bin Numbers between the detected surface and the clutter position from the sidelobe. A zero means no clutter indicated in this field since less than 3 bins contains significant clutter.

L1B21_L1C21_HEADER

Name	Format	Description
prCalCoef	structure	defined as type structure of PR_CAL_COEF.
rayHdr	array of structures.	defined as type structure of RAY_HEADER.

PR_SCAN_STATUS

Name	Format	Description
missing	1-byte integer	Missing indicates whether the information is contained in the scan data. The values are 0 Scan data elements contains information. 1 Scan was missing in the telemetry data 2 Scan data contains no elements with rain.
validity	1-byte integer	Values: ------ This is a summary of status modes. If all modes are routine, all bits in Validity = 0. Routine means that scan data has been measured in the normal operational situation as far as the status modes are concerned. Validity does not assess data or geolocation quality. validity is broken into 8 bit flags. Each bit=0 if the status is routine, but the bit=1 if it is not routine. Bit Meaning --- ------- 0 - Scan completely missing 1 - Non-routine spacecraft orientation (2 or 3) 2 - Non-routine ACS mode (other than 4) 3 - Non-routine yaw update status (0 or 1) 4 - Non-routine inst. status (other than 1) 5 - Non-routine QAC (non-zero) 6 - Spare 7 - Spare
qac	1-byte integer	The Quality and Accounting Capsule of the Science packet as it appears in Level-0 data. If no QAC is given in L0, which means no decoding errors occured, qac in this format has a value of zero.
geoQuality	4-byte integer	Content is TBD.
dataQuality	1-byte integer	The Quality of Data on a given scan line is the percentage of pixels whose values are within the acceptable range listed in the Metadata.
scOrient	1-byte integer	Current Spacecraft Orientation Value Meaning ----- -------

	0	+x forward
	1	-x forward
	2	-y forward
	3	Unknown Orientation

acsMode 1-byte integer — Current ACS Mode

Value	Meaning
0	Standby
1	Sun Acquire
2	Earth Acquire
3	Yaw Acquire
4	Nominal
5	Yaw Maneuver
6	Delta-H (Thruster)
7	Delta-V (Thruster)
8	CERES Calibration

yawUpdateS 1-byte integer — Yaw Update Status

Value	Meaning
0	Inaccurate
1	Indeterminate
2	Accurate

prMode 1-byte integer — Value Meaning

Value	Meaning
1	Observation Mode
2	Internal Calibration Mode
3	External Calibration Mode
4	Analysis Mode
5	Stan-by Mode

prStatus1 1-byte interger — Description of PR sensor status such as FCIF component used (A or B) and initialization in onboard surface search algorithm. Details are to be announced by NASDA.

PrStatus1 1-byte integer — same as prStatus1, but for C structure definition.

prStatus2 1-byte interger — Description of PR sensor status such as FCIF component used (A or B) and initialization in onboard surface search algorithm. Details are to be announced by NASDA.

fractOrbitN 4-byte float — The orbit number and fractional part of the orbit at Scan Time. The orbit number will be counted from the beginning of the mission.

POWERS (PR)
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avgPeakPower	2-byte integer	Average of the packets of 8 Solid Power Amplifier Transmitter Powers (dBm). A "packet" of 8 powers (out of 128 possible) are sent with each scan. The next scan will have a packet of the next 8 powers.
sspaNum	2-byte integer	The first SSPA number in the packeet of 8 sent to the ground. The first packet will have SSPA number 1, the second number 9, and so on up to 121.
biasLogAmp	4-byte float	The Log-amp-input terminated noise level of the SSPA transmitter power (dBm).
atten	4-byte float	The Attenuation (dBm) is the flux density (power) of a beam of energy dissipated. It is the receiver gain setting.
peakPower	4-byte float	The Peak Power is the amount of power transmitted during a given pulse (dBm).

L1B_21_SWATHDATA

Name	Format	Description
scanTime	8-byte float	A time associated with the scan. The exact relationship between Scan Time and the time of each IFOV is described in Section 2.1 of the file specifications. Scan Time is expressed as the UTC seconds of day.
geolocation	4-byte float (2 x 49)	The earth location of the center of the IFOV at the altitude of the geoid. The first dimension is latitude and longitude, in that order. The next dimension are pixel and scan. Values are represented as floating point decimal degrees. Off-earth is represented as less than or equal to -9999.9. Latitude is positive north, negative south. Longitude is positive west. A point on the 180th meridian is assigned to the western hemisphere.
scanStatus	15-byte Record	The status of each scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Details of scanStatus are described in the PR_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the PR_NAVIGATION section.
power	16-byte Record	The details of power are described in the PR_POWER section.
systemNoise	4-byte float 1-D array (49)	System Noise (dBm) is an average of the 4 measured system noise values. The range is -120 dBm to -20 dBm. Missing data are given a value of -29,999.
minEchoFlag	1-byte integer array (49)	Flag to show the presence of rain in the ray. Values are 0 = no rain 1 = rain possible 2 = rain certain
binStormHeight	2-byte integer array (2 x 49)	Range bin number of the strom top. The first dimension is threshold, with values of possible rain thresholdand certain rain threshold in that order. The bin Storm Heights are generated in

		the procedure to determine the Minimum Echo Flag. The Bin Storm Height is the top range bein of the portion of consecutive range bins that flagged the ray as rain possible or rain certain.
scLocalZenith	4-byte float array (49)	The angle in degrees between the local zenith and the beam's center line. The zenith at the intersection of the ray and the earth ellipsoid is used.
binEllipsoid	2-byte integer array (49)	Range bin number of the earth ellipsoid for the ray.
osBinStart	2-byte integer 1-D array (29)	The starting range bin number of the oversample (either surface or rain) data, counting from the top down. The Bin Start of Oversample only applies to the rays that have oversample data (rays #11 to #39).
binSurfPeak	2-byte integer 1-D array (29)	The range bin number of the peak surface echo.
normalSample	4-byte float 2-D array (140 x 49)	Return power (dBm) of the normal sample, Since each ray has a different size, the elements after the end of each aray are filled with missing values. The size of each ray is specified in the Ray Header. The range is -120 dBm to -20 dBm. Missing values are -29,999
osSurf	4-byte float 2-D array (5 x 29)	Return power (dBm) of the surface echo oversampling for the central 29 rays (rays #11 - 39). Range: -120 dBm to -20 dBm. Missing values: -29,999. In the CrossTrack dimension, Offset=-10, Increment=1.
osRain	2-byte integer 2-D array (28 x 11)	Return power (dBm) of the rain echo oversample for the central 11 rays (rays #20-30). Range -120 dBm to -20 dBm. Missing data: -29,999. In the CrossTrack dimension, Offset = -19, Increment=1.

L1C_21_SWATHDATA

This has the same format as L1B_21_SWATHDATA.

L2A_21_SWATHDATA

Name	Format	Description
scanTime	8-byte float	The UTC seconds-of-the-day of the first IFOV of the scan.
geolocation	2-byte float 2-D array (2 x 49)	The Geolocation, which includes latitude and longitude, is the center of the IFOV at the geoid. The values are represented as floating point decimal degrees. Off-earth is represented as -9999.9. Latitude (index=0) is positive north, negative south. Longitude (index=1) is positive east, negative west. A point on the 180 degree meridian is assigned to the western hemisphere.
scanStatus	15-byte Record	The status of eachy scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the PR_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the PR_NAVIGATION section.
sigmaZero	4-byte float array (49)	The sigma-zero is the normalized surface cross section. It ranges from -50.00 to 20.00 dB.
pathAtten	4-byte float array (49)	This is the estimate of path-attenuation when rain is present. it ranges from 0.00 to 50.00 dB.
reliab	2-byte integer array (49)	The reliablility is the estimate of path-attenuation associated reliability factor. It has the following values: Value Meaning 0 unreliable 1 marginally reliable 2 reliable 3 lower bound 9 no-rain case
incAngle	4-byte float	The incident angle is that between the nadir and the radar beam. It ranges from -30.0 to

	array (49)	+30.0 degree.
rainFlag	2-byte integer array (49)	The rain flag has the following values: Value Meaning ----- ------- 0 no rain 1 rain

L2A_23_SWATHDATA

Name	Format	Description
scanTime	8-byte float	A time associated with the scan. The exact relationship between the Scan Time and the time of each IFOV is described in Volume 3, Section 3 of the ICS. Scan Time is expressed as UTC seconds of the day.
geolocation	4-byte float 2-D array (2 x 49)	The Geolocation, which includes latitude and longitude, is the center of the IFOV at the geoid. The values are represented as floating point decimal degrees. Off-earth is represented as -9999.9. Latitude (index=0) is positive north, negative south. Longitude (index=1) is positive east, negative west. A point on the 180 degree meridian is assigned to the western hemisphere.
scanStatus	15-byte Record	The status of eachy scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the PR_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the PR_NAVIGATION section.
rainFlag	1-byte integer array (49)	The rain flag has the following values: Value Meaning ----- ------- 0 no rain 1 rain
rainType	1-byte integer array	The rain type flag has the following values: Value Meaning

	(49)	----- ------- 1 stratus 2 cumulus 3 others
warmRain	1-byte integer array (49)	The warm rain flag has the following values: Value Meaning ---- ------- 0 warm rain is not detected 1 there may be warm rain 2 warm rain is detected (with high confidence)
status	1-byte integer array (49)	The status flag indicates whether the data are obtained over sea or land and the quality of 2A-23 product data. It is set as follows: Value Meaning ---- ------- 0 good (over sea) 1 maybe good (over sea) 2 doubtful (over sea) 10 good (over land) 11 maybe good (over land) 12 doubtful (over land)
rangeBinNum	1-byte integer array (49)	The Range Bin Number is that corresponding to the height of bright band.
HBB	2-byte integer array (49)	The Height of Bright Band is that above sea level in meters. If the bright band is not detected, the height is set to zero.
freezH	2-byte integer array (49)	The Height of Freezing Level is the estimated height of 0 degree Celcius isothermal above sea level in meters.
stormH	2-byte integer array (49)	The Height of Storm is that above sea level in meters. In the absense of precipitation, this value is set to zero.

CFLAGS

Name	Format	Description
mainlobeEdge	1-byte	Absolute value of the difference in the range bin

	integer	numbers between the detected surface and the edge of the clutter from the mainlobe.
sidelobeRange	3x1-byte integer	Absolute value of the difference in Range Bin Numbers between the detected surface and the clutter position from the sidelobe. A zero means no clutter indicated in this field since less than 3 bins contained significant clutter.

CLUTTER_FLAGS

Name	Format	Description
clutFlag	Array of structures	structure of type CFLAGS

L2A_25_SWATHDATA

Name	Format	Description
scanTime	8-byte float	The time associated with the scan. The exact relationship between the ScanTime and the time of each IFOV is described in ICS volume 3, section 3. Scan Time is expressed as the UTC seconds of the day.
geolocation	4-byte float 2-D array (2 x 49)	The Geolocation, which includes latitude and longitude, is the center of the IFOV at the geoid. The values are represented as floating point decimal degrees. Off-earth is represented as -9999.9. Latitude (index=0) is positive north, negative south. Longitude (index=1) is positive east, negative west. A point on the 180 degree meridian is assigned to the western hemisphere.
scanStatus	15-byte Record	The status of eachy scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the PR_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the PR_NAVIGATION section.
rain	4-byte float 2-D array	This is the estimate of rain rates at the radar gates from 0 to 20 km. It ranges from 0.0 to 3000.0 mm h^-1.

	(80 x 49)	
reliab	1-byte integer 2-D array (80 x 49)	The Reliability is that for estimated rain rates at the radar range gates from 0 to 20 km. It ranges from 0 which means the most reliable to 255 which means the least reliable. If data values are missing, the reliability will be set as 10000000 in binary, other values TBD.
correctZFactor	4-byte float 2-D array (80 x 49)	This is the attenuation corrected Z-factor at the radar range gates from 0 to 20 km. It ranges from 0.1 to 80.0 dB of mm^6 m^-3.
attenParmAlpha	4-byte float 2-D array (10 x 49)	The attenuation parameter Alpha relates the attenuation coefficient, k(dB/km) to the Z-factor: k = Alpha * Z^Beta. Alpha is computed at 5 radar gates for each ray. It ranges from 0.000100 to 0.002000.
attenParamBeta	4-byte float 2-D array (10 x 49)	The attenuation parameter Beta relates the attenuation coefficient k (dB/km) to the Z factor: k = Alpha * Z^Beta. Beta is computed at 5 radar gates for each ray. It ranges from 0.500 to 2.000.
ZRParmA	4-byte float 2-D array (10 x 49)	Parameter A for Z-R relationship (R=A*Z^b) is determined from the rain type and the height relative to the freezing level, the non-uniformity parameter and the correction factor for the surface reference technique. A is computed at radar range gates for each ray. It ranges from 0.0050 to 0.2000.
ZRParmB	4-byte float 2-D array (10 x 49)	Parameter B for Z-R relationship (R=A*Z^b) is determined from the rain type and the height relative to the freezing level, the non-uniformity parameter and the correction factor for the surface reference technique. B is computed at 5 radar range gates for each ray. It ranges from 0.500 to 1.000.
rainFlag	2-byte integer array (49)	The Rain Flag indicates rain or no rain status. The detail is TBD.
rangeBinNum	2-byte integer 2-D array (3 x 49)	Range Bin Numbers are those for the rain top, the rain bottom and the topograhic surface. Range bin numbers in this algorithm are different from NASDA definition. They range from 0 to 79 with an interval of 250m, zero is defined as the earth ellipsoid.

rainAve	4-byte float 2-D array (2 x 49)	The Average Rain Rate is that for each ray between the two predefined heights of 2 and 4 km. It ranges from 0.00 to 3000.0 mm h^-1.
weightW	4-byte float array (49)	The Weight W is the weighting function of an estimate of the path-integrated attenuation and its reliability. It ranges from 0.000 to 1.000.
method	2-byte integer array (49)	This flag indicates which method is used to derive the rain rate. It ranges from 0 to 10. The names of methods are TBD.
epsilon	4-byte float array (49)	Epsilon (e) is the correction factor for the surface reference. It ranges from 0.0000 to 100.0000.
zeta	4-byte float array (49)	Zeta roughly represents the rain rate integerated along the ray. It ranges from 0.0000 to 100.0000.
zeta_m	4-byte float array (49)	Zeta_m is the average of zeta in the vicinity of each beam position (average over three scans and three beams). It ranges from 0.0000 to 100.0000.
zeta_s	4-byte float array (49)	Zeta_s is the deviation of zeta in the vicinity of each beam position (three scans and three beams). It ranges from 0.0000 to 100.0000.
xi	4-byte float array (49)	Xi is the horizontal non-uniformity parameter os the rain field within a ray. It ranges from 0.0000 to TBD.
nubfCorrectFactor	4-byte float array (49)	The NUBF (Non-Uniform Beam Filling) correction factor is used in the NUBF correction for Z-factor and Rain Rate.
qualityFlag	1-byte array (49)	This quality flag gives the overall error that affects the entire angle bin data, such as the error associated with the non-uniform beam filling, and the surface reference reliability. It ranges from 0 to 255. If data are missing, the

reliability will be set aas 1000000 in binary. Other values are TBD.

L2B_31_SWATHDATA

Name	Format	Description
scanTime	8-byte float	A time associated with the scan. The exact relationship between Scan Time and the time of each IFOV is described in Section 2.1 of the file specifications. Scan Time is expressed as the UTC seconds of day.
geolocation	4-byte float (2 x 49)	The earth location of the center of the IFOV at the altitude of the geoid. The first dimension is latitude and longitude, in that order. The next dimension are pixel and scan. Values are represented as floating point decimal degrees. Off-earth is represented as less than or equal to -9999.9. Latitude is positive north, negative south. Longitude is positive west. A point on the 180th meridian is assigned to the western hemisphere.
scanStatus	15-byte Record	The status of each scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Details of scanStatus are described in the PR_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the PR_NAVIGATION section.
dHat	4-byte float array (1x49)	The D-hat is the correlation-corrected mass-weighted mean drop diameter. It ranges from 0.50 to 2.50 "normalized"* mm. The accuracy is 0.01 "normalized mm.
sigmaDHat	4-byte float array (1x49)	The sigma-D-Hat is the RMS uncertainity in the correlation-corrected mass-weighted mean drop diameter. It ranges from 0.00 to 2.00 "normalized"*mm. The accuracy is 0.01 "normalized mm.
sigmaSHat	1-byte integer array (1x49)	The sigma-D-Hat is the RMS uncertainity in the correlation-corrected relative spread of mass-weighted mean drop diameter. It ranges from 0 to 60 "normalized" % with accuracy of 1.
epsilon	4-byte	The epsilon is the corrected made to the input path-integrated

	float array (1x49).	attenuation estimate. It ranges from -50.0 to 50.0 dB. The accuracy is 0.1dB.
sigmaEpsilon	4-byte float array (1x49)	The sigma epsilon is the RMS uncertainity in the correction made to the input path-integrated attenuation estimate. It ranges from 0.0 to 50.0 dB. The accuracy is 0.1dB.
rHat	4-byte float 2 D array (49 x 60)	The R-Hat is the instantaneous rain rate at the radar range gates. It ranges from 0.0 to 500.0 mm/hr. The accuracy is 0.1 mm/hr
sigmaRHat instantaneous	4-byte	The Sigma-R-hat is the RMS uncertainity in the
	float 2 D array (49x60)	rain rate at the radar range gates. It ranges from 0.0 to 125.0 mm/hr. The accuracy is 0.5 mm/hr
pia It	4-byte	The PIA is the PR+TMI path-integrated attenuation estimate.
	float array(1x49)	ranges from 0.0 to 50.0 dB. The accuracy is 0.1 dB.
sigmaPIA path-	4-byte	The sigma-PIA is the RMS uncertainity in the PR+TMI
	float	integrated attenuation estimate. It ranges from 0.0 to 50.0
dB.	array (1x49)	The accuracy is 0.1 dB.
tmiPIA	4-byte float array(1x104)	The TMI-PIA is the TMI estimate of the path-integrated attenuation. It ranges from 0.0 to 50.0 dB. The accuracy is 0.1 dB.
sigmaTMIpia estimate	4-byte	The Sigma-TMI-PIA is the RMS uncertainity in the TMI
	float array(1x104)	of the path-integrated attenuation. It ranges from 0.0 to 50.0 dB. The accuracy is 0.1 dB.
a		normalized units are defined as follows, suppose there exists
		variable Y where Y = X * R^0.37, the units of are called normalized grams.

L3A_25_PLANETGRID1

Name	Format	Description
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gridStruct1	5000-byte character Record	GridStructure gives the specification of the geometry of the grids. See Section 2 in Volume 3 of the ICS.
rainMean1	4-byte float 3-D Array (6 x 16 x 72)	These are means of nonzero rain rates over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heights of 2, 4, 6, 10 and 15 km. Ranges are TBD
rainDev1	4-byte float 3-D Array (6 x 16 x 72)	These are standard deviations of nonzero rain rates over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heights of 2, 4, 6, 10 and 15 km. Ranges are TBD.
convRainMean1	4-byte float 3-D Array (6 x 16 x 72)	These are means of nonzero rain rates for convective rain over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heithts of 2,4,6, 10 and 15 km. Ranges are TBD.
convRainDev1	4-byte float 3-D Array (6 x 16 x 72)	These are standard deviations of nonzero rain rates for convective rain over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heights of 2, 4, 6, 10 and 15 km. Ranges are TBD.
stratRainMean1	4-byte float 3-D Array (6 x 16 x 72)	These are means of nonzero rain rates for stratiform rain over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heightrs of 2, 4, 6, 10 and 15 km. Ranges are TBD.
stratRainDev1	4-byte float 3-D Array (6 x 16 x 72)	These are standard deviations of nonzero rain rates for stratiform rain over (5 degree) x (5 degree) boxes and one month. The rain rates are determined in 2A-25 and evaluated for path-average and at the fixed heights of 2, 4, 6, 10 and 15 km. Ranges are TBD.
zmMean1	4-byte float 3-D Array (6 x 16 x 72)	The Zm Means are means of measured radar reflectivity at the fixed heights of 2, 4, 6, 10 and 15 km and for path average over (5 degree) x (5 degree) boxes and one month using data from 1C-21 (or 1B-21).
zmDev1	4-byte float	The Zm Dev. are standard deviation of measured radar reflectivity at the fixed heights of 2,

	3-D Array (6 x 16 x 72)	4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one month data from 1C-21 (or 1B-21).
ztMean1	4-byte float 3-D Array (6 x 16 x 72)	The Zt Means are means of corrected radar reflectivity factors at the fixed heights of 2, 4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one month using data from 2A-25.
ztDev1	4-byte float 3-D Array (6 x 16 x 72)	The Zt Dev. are standard deviations of corrected radar reflectivity foctors at the fixed heights of 2, 4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one month using data from 2A-25.
tt1Pix1	4-byte integer 2-D Array (16 x 72)	The Total Pixel Number 1 is the number of total pixels over (5 degree) x (5 degree) boxes and one month. Ranges are TBD.
rainPix1	4-byte intetgernonzero 3-D Array (6 x 16 x 72)	The Rain Pixel Number 1 is the number of rain rate pixels at the fixed heights of 2, 4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one month. Ranges are TBD.
convRainPix1	4-byte integer 3-D Array (6 x 16 x 72)	The Conv. Rain Pixel Number 1 is the number of nonzero rain rate pixels for convective rain at the fixed heights of 2, 4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one-month. Ranges are TBD.
stratRainPix1	4-byte integer 3-D Array (6 x 16 x 72)	The Strat. Rain Pixel Number 1 is the number of nonzero rain rate pixels for stratiform rain at the fixed heights of 2, 4, 6, 10 and 15 km and for path-average over (5 degree) x (5 degree) boxes and one month. Ranges are TBD.
stormHH	2-byte integer 3-D Array (30 x 16 x 72)	These are histograms of the 'effective' storm heights for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
convStormHH	2-byte integer 3-D Array (30 x 16 x 72)	These are histograms of the 'effective' storm heights for convective rain for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
stratStormHH	2-byte integer 3-D Array (30 x 16 x 72)	These are histograms of the 'effective' storm heights for stratiform rain for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.

BBHH	2-byte integer 3-D Array (30 x 16 x 72)	These histograms of the bright-band heights for 20 categories over a (5 degree) x (5 degree) box and one month, given that the bright band is detected. Range are TBD.
snowIceLH	2-byte integer 3-D Array (30 x 16 x 72)	These are histograms of the depth of snow-ice layer for 20 categories over a (5 degree) x (5 degree) box and one month. The depth of snow-ice layer is defined as the difference between effective storm height and estimated height of (0 degree Celcius) isotherm. Ranges are TBD.
zmH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	The Zm Hist. are histograms of measured reflectivities of rain pixels at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
convZmH	2-byte integer 4-D Array (20 x 6 16 x 72)	The Conv. Am Hist. are histograms of measured reflectivities of convective rain pixels at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
stratZmH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	The Strat. Zm Hist. are histograms of measured reflectivities of stratiform rain pixels at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
ztH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	The Zt Hist. are histograms of corrected reflectivity factors for rain pixels at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
convZtH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	The Conv. Zt Hist. are histograms of corrected reflectivity factors for convective rain pixel at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree)x (5 degree) box and one month. Ranges are TBD.
stratZtH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	The Strat. Zt Hist are histograms of corrected reflectivity factors for straitform rain pixels at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
rainH	2-byte integer	These are histograms of nonzero rain rate pixels at five heights (2, 4, 6, 10 and 15 km)

	4-D Array (20 x 6 x 16 x 72)	and path average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
convRainH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	These are histograms of nonzero rain rate pixels for convective rain at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
stratRainH	2-byte integer 4-D Array (20 x 6 x 16 x 72)	These are histograms of nonzero rain rate pixels for stratiform rain at five heights (2, 4, 6, 10 and 15 km) and path-average for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
zmGradH	2-byte integer 4-D Array (20 x 3 x 16 x 72)	These are histograms of the vertical gradient in measured reflectivity at 3 levels for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
xiH	2-byte integer 3-D Array (30 x 16 x 72)	The Xi Hist. is the histogram of non-uniformity parameter determined in 2A-25 for 20 categories over a (5 degree) x (5 degree) box and one month. Ranges are TBD.
rainCCoef	4-byte float 3-D Array (3 x 16 x 72)	These are correlation coefficients of nonzero rain rates at 3 heights (2 vs 4, 2 vs 6, and 4 vs 6 km) for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
convRainCCoef	4-byte float 3-D Array (3 x 16 x 72)	These are correlation coefficients of nonzero rain rates for convective rain at 3 heights (2 vs 4, 2 vs 6, and 4 vs 6 km) for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
stratRainCCoef	4-byte float 3-D Array (3 x 16 x 72)	These are correlation coefficients of nonzero rain rates for stratiform rain at 3 heights (2 vs 4, 2 vs 6, and 4 vs 6 km) for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
stormHtZmCCoef	4-byte float 2-D Array (16 x 72)	This is the correlation coefficient between the storm height and the maximum measured reflectivity factor along the path for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
piaCCoef	4-byte	This is the correlation coefficient between

	float 3-D Array (4 x 16 x 72)	the path-integrated attenuation (PIAs) as determined from the SRT and from the measured reflectivity at angles of (0, 5, 10, and 15 degrees) for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
xiZmCCoef	4-byte float 2-D Array (16 x 72)	This is the correlation coefficient between the non-uniformity and the maximum measured reflectivity factor along the path for a (5 degree) x (5 degree) box and one month. It ranges from -1.000 to 1.000.
convZmMean1	4-byte float 3 D array (6x72x16)	Conv Zm Mean1 gives the monthly means of measured radar reflectivity for convective rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed from 1C-21(or1B-21).It ranges from -20 to 80 dBZ.
convZmDev1	4-byte float 3 D array (6x72x16)	Conv Zm Dev1 gives the monthly standard deviations of measured radar reflectivity for convective rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed from 1C-21(or1B-21).It ranges from 0 to 100 dBZ.
stratZmMean1	4-byte float 3 D array (6x72x16)	strat Zm Mean1 gives the monthly means of measured radar reflectivity for stratiform rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed from 1C-21(or1B-21).It ranges from -20 to 80 dBZ.
stratZmMean1	4-byte float 3 D array (6x72x16)	strat Zm Mean1 gives the monthly standard deviations of measured radar reflectivity for stratiform rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed from 1C-21(or1B-21).It ranges from 0 to 100 dBZ.
convZtMean1	4-byte float 3 D array (6x72x16)	strat Zm Mean1 gives the monthly means of corrected radar reflectivity for convective rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed from 1C-21(or1B-21).It ranges from 0.1 to 80 dBZ.
convZtDev1	4-byte float 3 D array (6x72x16)	strat Zm Mean1 gives the monthly standard deviations of corrected radar reflectivity for convective rain at a horizontal resolution of 5 degree x 5 degree. The path averaged mean and means at the fixed heights of 2,4,6,10 and 15km are calculated using data outputed

		from 1C-21(or1B-21).It ranges from 0.0 to 80 dBZ.
piaSrtMean	4-byte float 3-D array (4x16x72)	PIA srt Mean gives the monthly means of SRT path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
piaSrtDev	4-byte float 3-D array (4x16x72)	PIA srt Dev gives the monthly standard deviations of SRT path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
piaHbMean	4-byte float 3-D array (4x16x72)	PIA Hb Mean gives the monthly means of HB path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
piaHbDev	4-byte float 3-D array (4x16x72)	PIA hb Dev gives the monthly standard deviations of HB path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
pia0Mean	4-byte float 3-D array (4x16x72)	PIA 0 Mean gives the monthly means of 0th order path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
pia0Dev order	4-byte float 3 D array (4x16x72)	PIA 0 Dev gives monthly standard deviations of 0th path-integrated attenuation calculated at four fixed incident angles. It has horizontal resolution of 5 degree x 5 degree. Its units is dB/km & ranges are TBD.
stormHtDev	4-byte float 3-D array (3x72x16)	storm height dev is the standard deviation of the storm height for uncondition, and condition of stratiform rain and convective rain. It has units of meters and range is TBD.
stormHtMean	4-byte float 3-D array (3x72x16)	storm height Mean is the means deviation of the storm height for uncondition, and condition of stratiform rain and convective rain. It has units of meters and range is TBD.
XiDev	4-byte float 3-D array (3x72x16)	Xi Dev gives monthly standard deviation of the horizontal non uniformity parameter of the rain field within a ray at a horizontal resolution of 5 degree x 5 degree It ha no units and ranges from 0.0 to TBD.
XiMean	4-byte float 3-D array	Xi Mean gives monthly means of the horizontal non uniformity parameter of the rain field within a

	(3x72x16)	ray at a horizontal resolution of 5 degree x 5 degree It ha no units and ranges from 0.0 to TBD.
nubfCorFacDev factor	4-byte float	The NUBF(Non Uniform Beam Filling) correction
	2-D array (72x 16)	gives the monthly standard deviation of NUBF correction for Z - factor and rain rate at a horizontal resolution of 5 degree x 5 degree. No units and ranges is TBD.
nubfCorFacMean factor	4-byte float	The NUBF(Non Uniform Beam Filling) correction
	2-D array (72x 16)	mean gives the monthly mean of NUBF correction for Z - factor and rain rate at a horizontal resolution of 5 degree x 5 degree. No units and max value is 2.0.
bbHtDev bright	4-byte float	BB height Dev gives the monthly deviation of the
	2-D array	band height at a horizontak resolution of 5 degree and 5 degree. It has units of meters and ranges are TBD
bbHtMean	4-byte float	BB height Mean gives the monthly deviation of the bright
	2-D array	band height at a horizontal resolution of 5 degree and 5 degree. It has units of meters and ranges are TBD
piaSrtH	2-byte integer	PIA srt H gives the histograms of path attenuation as
	4-D array (4x20x72x16)	determined by the surface reference technique (SRT) at four incidence angles(0, 5, 10, 15 degrees) for 20 categories over a 5 degree x 5 degree box and one month. It ranges from 0 to 32767.
pia0H	2-byte integer	PIA oth H is the histogram of oth order path integrated
	4-D array (4x20x72x16)	attenuation with the horizontal resolution of 5 degree x 5 degree. This histogram is calculated for 30 categories at 4 incidence angles(0, 5, 10, 15 degrees) It ranges from 0 to 32767.
piaHbH	2-byte integer	These are histograms of path attenuation using an
	4-D array (4x20x72x16)	estimate derived from measured reflectivity (Zm) and a k-Z relationship at 4 incidence angles(0, 5, 10, 15 degrees) for 20 categories over a 5 degree x 5 degree box and one month. It ranges from 0 to 32767.
nubfH of	2-byte integer	NUBF(Non Uniform Beam Filling) H gives the histogram
	3-D array (30x72x16)	the NUBF correction for Z factor and rain rate of 30 different categories over a 5 degree x 5 degree grid boxes. It ranges from 0 to 32767.
zpzmH	2-byte integer	zpzmH is the histogram of the difference between the
	3-D array (30x72x16)	reflectivity at two heights (Bright Band - Epsilon) and (Bright Band + Epsilon). This histogram is calculated for 30 different categories at each grid box of 5 degree x 5 degree It ranges from 0 to 32767.

L3A_25_PLANETGRID2

Name	Format	Description
gridStruct2	500-byte character Record	GridStructure 2 gives the specification of the geometry of the grids. See Section 2 in Volume 3 of the ICS, Level 1 File Specifications.
rainMean2	4-byte float 3-D Array (3 x 148 x 720)	These are means of nonzero rain rates over (0.5 degree) x (0.5 degree) boxes and one month. The rain rates are determined in 2A-25 at the fixed heights of 2, 4, and 6 km. Ranges are TBD.
rainDev2	4-byte float 3-D Array (3 x 148 x 720)	These are standard deviations of nonzero rain rates over (0.5 degree) x (0.5 degree) boxes and one month. The rain rates are determined in 2A-25 at the fixed heights of 2, 4, and 6 km. Ranges are TBD.
convRainMean2	4-byte float 3-D Array (3 x 148 x 720)	These are means of nonzero rain rates for convective rain over (0.5 degree) x (0.5 degree) boxes and one month. The rain rates are determined in 2A-25 at the fixed heights of 2, 4, and 6 km. Ranges are TBD.
convRainDev2	4-byte float 3-D Array (3 x 148 x 720)	These are standard deviations of nonzero rain rates for convective rain over (0.5 degree) x (0.5 degree) boxes and one month. The rain rates are determined in 2A-25 at the fixed heights of 2, 4, and 6, km. Ranges are TBD.
stratRainMean2	4-byte float 3-D Array (3 x 148 x 720)	These are means of nonzero rain rates for stratiform rain over (0.5 degree) x (0.5 degree) boxes and one month. These rain rates are determined in 2A-25 at the fixed heithts of 2, 4, and 6 km. Ranges are TBD.
stratRainDev2	4-byte float 3-D Array (3 x 148 x 720)	These are standard deviations of nonzero rain rates for stratiform rain over (0.5 degree) x (0.5 degree) boxes and one month. The rain rates are determined in 2A-25 at the fixed heights of 2, 4, and 6 km. Ranges are TBD.

ttlPix2	4-byte integer 2-D Array (148x720)	The Total Pixel Number 2 is the number of total pixels over (0.5 degree) x (0.5 degree) boxes and one month. Ranges are TBD.
rainPix2	4-byte integer 3-D Array (4 x 148 x 720)	The Rain Pixel Number 2 is the number of nonzero rain rate pixel at the fixed heights of 2, 4, and 6 km over (0.5 degree) x (0.5 degree) boxes and one month. Ranges are TBD.
convRainPix2	4-byte integer 3-D Array (4 x 148 x 720)	The Con. Rain Pixel Number 2 is the number of nonzero rain rate pixels for convective rain at the fixed heights of 2, 4, and 6 km over (0.5 degree) x (0.5 degree) boxes and one month. Ranges are TBD.
stratRainPix2	4-byte integer 3-D Array (4 x 148 x 720)	The Strat. Rain Pixel Number 2 is the number of nonzero rain rate pixels for stratiform rain at the fixed heights of 2, 4, and 6 15 km over (0.5 degree) x (0.5 degree) boxes and one month. Ranges are TBD.
zmMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of measured reflectivity at 3 fixed heights levels(2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from -20 to 80 dBZ.
convZmMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of corrected reflectivity of convective rain at 3 fixed heights levels(2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from 0.1 to 80 dBZ.
stratZmMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of corrected reflectivity of stratiform rain at 3 fixed heights levels(2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from 0.1 to 80 dBZ.
ztMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of corrected reflectivity at 3 fixed heights of (2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from 0.1 to 80 dBZ.
convZtMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of corrected reflectivity of convective rain at 3 fixed heights levels(2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from 0.1 to 80 dBZ
stratZtMean2	4 byte float 3-D array (3x720x148)	It gives the monthly means of corrected reflectivity of stratiform rain at 3 fixed heights levels(2, 4, 6km) over a 0.5 degree x 0.5 degree grid boxes.Ranges from 0.1 to 80 dBZ.

stormHeightMean	4-byte float 3-D array (3x720x148)	It gives the monthly means of storm height for unconditioned, conditioned on the stratiform and conditioned on conv over a 0.5 degree x 0.5 degree grid boxes. It has units of meters and ranges are TBD.
bbHeightMean	4-byte float 2-D array (720x 148)	It gives the monthly means of Bright Band height over grid boxes of 0.5 degree x 0.5 degree. It has units of meters and ranges are TBD.

L3A_25_GRID

Name	Format	Description
grid1	Record	Described above in L3A_25_PLANETGRID1.
grid2	Record	Described above in L3A_25_PLANETGRID2.

L3A_26_GRID

Name	Format	Description
gridStruct	5000-byte Record	GridStructure gives the specification of the geometry of he grids. See Section 2 in Volume 3 of ICS, Level 1 File Specifications.
rainTTL	4-byte float 3-D Array (4 x 16 X 72)	Rainfall Totals consist of monthly rainfalls at 3 fixed heights (2, 4, and 6 km) and monthly rainfall derived from the path-averaged rain rates at each (5 degree) x (5 degree) box. Only those rain rates over an "effective dynamic range" of the radar will be used. Ranges are TBD.
overFitP	4-byte float 5-D Array (3 x 4 x 110 x 16 x 72)	These are three parameters of the fitting function for the rain rate probability distribution function (PDF) for each overpass at each (5 degree) x (5 degree) box. The fitting parameters are computed at 3 fixed heights (2, 4, and 6 km) and for the path-average. The fitting function is either log-normal or gamma. Ranges are TBD.
monthFitP	4-byte float 4-D Array	These are three parameters of the fitting function for the rain rate PDF for each month at each (5 degree) x (5 degree) box. The

	(3 x 4 x 16 x 72)heights	fitting parameters are computed at 3 fixed (2, 4, 6 km) and for the path average. The fitting function is either log-normal or gamma. Ranges are TBD.
fractArea	4-byte float 5-D Array (4 x 10 x 110 x 16 x 72)	These are the fractional areas in which rain rates are above selected minimum thresholds for each overpass at each (5 degree) x (5 degree) box. There are four rain rate products (2, 4, 6 km and path-averaged) and ten thresholds. Fractional area ranges from 0.000 to 1.000.

L3B_31_GRID

Name	Format	Description
gridStruct	5000-byte Record	GridStructure gives the specification of the geometry of he grids. See Section 2 in Volume 3 of ICS, Level 1 File Specifications.
surfRainfall	4-byte float array (16x72)	The surface rainfall is the surface rain accumulation in 5 x 5 degree boxes. It ranges from 0.0 to 3000.0 mm.
surfAdjRatio	4-byte float array (16x72)	The surface adjustment ratio is calculated from the swath overlap region for each 5 x 5 deg box
cloudWater	4-byte float array (16x72x14)	The cloud water is that at each vertical layer in each 5 x 5 degree box for one month. It ranges from 0.0 to 1000.0 g m^-3.
rainWater	4-byte float array (16x72x14)	The rain water is that at each vertical layer in each 5 x 5 degree box for one month. It ranges from 0.0 to 1000.0 g m^-3.
cloudIce	4-byte float array (16x72x14)	The cloud ice is that at each vertical layer in each 5 x 5 degree box for one month. It ranges from 0.0 to 1000.0 g m^-3.
graupel	4-byte float array (16x72x14)	The graupel is that at each vertical layer in each 5 x 5 degree box for one month. It ranges from 0.0 to 1000.0 g m^-3.
profAdjRatio	4-byte float array (16x72x14)	The Profile adjustment Ratio is the adjustment ratio for each vertical layer. Ther ratio is calculated from the swath overlap region for each 5 x 5 degree box.

TMI

TMI_SCAN_STATUS

Name	Format	Description
missing	1-byte integer	Missing indicates whether the information is contained in the scan data. The values are 0 Scan data elements contains information. 1 Scan was missing in the telemetry data
validity	1-byte integer	Values: 0 - Scan completely valid. 1 - Scan completely missing. 2 - Scan partially missing. 3 - Scan invalid due to spacecraft orientation. 4 - Scan invalid due to ACS mode. 5 - Scan invalid due to yaw update status. 6 - Scan invalid due to instrument status. 255 - Scan invalid due to reasons other than above.
qac	1-byte integer	The Quality and Accounting Capsule of the Science packet as it appears in Level-0 data.
geoQuality	4-byte integer	TBD.
ch1	1-byte integer	The Quality of Channel Data for a given channel on a given scan line is the percentage of pixels whose values are within the acceptable range listed in the Metadata.
ch2	1-byte integer	See Channel 1.
ch3	1-byte integer	See Channel 1.
ch4	1-byte integer	See Channel 1.
ch5	1-byte integer	See Channel 1.
ch6	1-byte	See Channel 1.

integer

ch7 1-byte See Channel 1.
integer

ch8 1-byte See Channel 1.
integer

ch9 1-byte See Channel 1.
integer

scOrient 1-byte Current Spacecraft Orientation
integer

Value	Meaning
0	+x forward
1	-x forward
2	-y forward
3	unknown orientation

acsMode 1-byte Current ACS Mode
integer

Value	Meaning
0	Standby
1	Sun Acquire
2	Earth Acquire
3	Yaw Acquire
4	Nominal
5	Yaw Maneuver
6	Delta-H (Thruster)
7	Delta-V (Thruster)
8	CERES Calibration

yawUpdate- 1-byte Yaw Update Status
Status integer

Value	Meaning
0	Inaccurate
1	Indeterminate
2	Accurate

tmiISstatus 1-byte TMI Instrument Status
integer

Bit	Meaning
00	Receiver Status (1=ON, 0=OFF)
01	Spin-up Status (1=ON, 0=OFF)
02	Spare Command 1 Status
03	Spare Command 2 Status
04	1 Hz clock Select (1=A, 0=B)
05	Spare Command 3 Status
06	Spare Command 4 Status
07	Spare Command 5 Status

fractOrbitN	4-byte float	The orbit number and fractional part of the orbit at Scan Time. The orbit number will be counted from the beginning of the mission.

CALIBRATION (TMI)

Name	Format	Description
hotTemp1	2-byte integer	The physical temperature, in degrees Kelvin, of temperature sensor 1 attached to the hot load. Range: 0 to 400 K.
hotTemp2	2-byte integer	The physical temperature, in degrees Kelvin, of temperature sensor 2 attached to the hot load. Range: 0 to 400 K.
hotTemp3	2-byte integer	The physical temperature, in degrees Kelvin, of temperature sensor 3 attached to the hot load. Range: 0 to 400 K.
posBridgeVolt	2-byte integer	The positive bridge voltage of the hot load bridge reference. Range: 0 to 4095.
nearZeroVolt	2-byte integer	The near zero voltage of the hot load bridge reference. Range: 0 to 4095.
temp85Ghz	2-byte integer	Receiver shelf temp of 85 GHz channel multiplied by 100 and stored as an integer. Range 0 to 400K.
topRadTemp	2-byte integer	Temperature of the top of the radiator channel multiplied by 100 and stored as an integer. Range: 0 to 400K.
autoCont1	1-byte integer	Automatic gain control for channel 1 in counts. Range: 0 to 15.
autoCont2	1-byte integer	Automatic gain control for channel 2 in counts. Range: 0 to 15.
autoCont3	1-byte integer	Automatic gain control for channel 3 in counts. Range: 0 to 15.
autoCont4	1-byte integer	Automatic gain control for channel 4 in counts. Range: 0 to 15.
autoCont5	1-byte integer	Automatic gain control for channel 5 in counts. Range: 0 to 15.

autoCont6 1-byte integer — Automatic gain control for channel 6 in counts. Range: 0 to 15.

autoCont7 1-byte integer — Automatic gain control for channel 7 in counts. Range: 0 to 15.

autoCont8 1-byte integer — Automatic gain control for channel 8 in counts. Range: 0 to 15.

autoCont9 1-byte integer — Automatic gain control for channel 9 in counts. Range: 0 to 15.

calCoef1A 4-byte integer — Calibration coefficient A (degrees Kelvin/ counts) for channel 1. This coefficient is used in the following equation to convert counts, C, to antenna temperature, T(A): T(A) = A*C + B

calCoef1B 4-byte integer — Calibration coefficient B (degrees Kelvin/ counts) for channel 1. This coefficient is used in the following equation to convert counts, C, to antenna temperature, T(A): T(A) = A*C + B

calCoef2A 4-byte integer — Calibration coefficient A for channel 2. See definition for Calibration Coefficient 1A.

calCoef2B 4-byte integer — Calibration coefficient B for channel 2. See definition for Calibration Coefficient 1B.

calCoef3A 4-byte integer — Calibration coefficient A for channel 3. See definition for Calibration Coefficient 1A.

calCoef3B 4-byte integer — Calibration coefficient B for channel 3. See definition for Calibration Coefficient 1B.

calCoef4A 4-byte integer — Calibration coefficient A for channel 4. See definition for Calibration Coefficient 1A.

calCoef4B 4-byte integer — Calibration coefficient B for channel 4. See definition for Calibration Coefficient 1B.

calCoef5A 4-byte integer — Calibration coefficient A for channel 5. See definition for Calibration Coefficient 1A.

calCoef5B 4-byte integer — Calibration coefficient B for channel 5. See definition for Calibration Coefficient 1B.

calCoef6A 4-byte integer — Calibration coefficient A for channel 6. See definition for Calibration Coefficient 1A.

calCoef6B 4-byte integer — Calibration coefficient B for channel 6. See definition for Calibration Coefficient 1B.

calCoef7A	4-byte integer	Calibration coefficient A for channel 7. See definition for Calibration Coefficient 1A.
calCoef7B	4-byte integer	Calibration coefficient B for channel 7. See definition for Calibration Coefficient 1B.
calCoef8A	4-byte integer	Calibration coefficient A for channel 8. See definition for Calibration Coefficient 1A.
calCoef8B	4-byte integer	Calibration coefficient B for channel 8. See definition for Calibration Coefficient 1B.
calCoef9A	4-byte integer	Calibration coefficient A for channel 9. See definition for Calibration Coefficient 1A.
calCoef9B	4-byte integer	Calibration coefficient B for channel 9. See definition for Calibration Coefficient 1B.

SCAN_TIME

Name	Format	Description
year	1-byte integer	Year
month	1-byte integer	Month
dayOfMonth	1-byte integer	Day of month
hour	1-byte integer	Hour
minute	1-byte integer	Minute
second	1-byte integer	Second
dayOfYear	1-byte integer	Day of Year

L1B_11_SWATHDATA

Name	Format	Description
scanTime	Structure	See definintion of SCAN_TIME structure.
geolocation	4-byte float 2-D Array (2 x 208)	The earth location of the center of the IFOV of the high resoluution (85 GHz) channels (channel 8 and 9) at the altitude of the geoid. The first dimension is latitude and longitude, in that order. The next dimensions are high resolution pixel and scan. Values are represented as floating point decimal degrees. Off-earth is represented as less than or equal to -9999. Latitude is positive north, negative south. Longitude is positive east, negative west. A point on the 180th meridian is assigned to the western hemisphere.
scanStatus	23-byte Record	The status of each scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the TMI_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the TMI_NAVIGATION section.
calib	91 byte Record	The details of navigate are described in the TMI_CALIBRATION section.
calCounts	2-byte integer 3-D Array (16 x 2 x 9)	Calibration measurements, in counts. The dimensions are: samples, load, and channel. The sample dimension has a maximum of 16. The load dimension has a first cold sky and then hot load. The low resolution channels (1-7) have 8 samples and the high resolution channels (8-9) have 16 samples.
satLocZen-Angle	4-byte float 1-D Array (12)	The angle, in degrees, between the local zentith and the satellite. This angle is given for every tenth low resolution pixel along a scan: pixel 1, 21,..., 201, 208. For the pixel dimension, Start = 0 and Stride = -20.
lowResCh	4-byte float 2-D Array (7 x 104)	Brightness temperature (K). The dimensions are: channel and pixel. The pixel dimension has Offset=0, Increment=-2. The following channels are included:

Channel	Frequency	Polorization
1	10 GHz	Vertical
2	10 GHz	Horizontal
3	19 GHz	Vertical
4	19 GHz	Horizontal
5	21 GHz	Vertical
6	37 GHz	Vertical
7	37 GHz	Horizontal

highResCh — 4-byte float 2-D Array (2 x 208)

Brightness temperature (K).
The dimensions are: channel and pixel.
The following channels are included:

Channel	Frequency	Polarization
1	85 GHz	Vertical
2	85 GHz	Horizontal

L2A_12_SWATHDATA

Name	Format	Description
scanTime	structure	See SCAN_TIME structure definition.
geolocation	4-byte float 2-D array (2 x 208)	The geolocation, which includes latitude and longitude, is the center of the IFOV at the geoid.The values are represented as floating point decimal degrees. Off-earth is represented as -9999.9. Latitude (index=0) is positive north, negative south. Longitude (index=1) is east, negative west. A point on the 180 degree positive meridian is assigned to the western hemisphere.
scanStatus	23-byte Record	The status of eachy scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the TMI_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the TMI_NAVIGATION section.
dataFlag	1-byte integer Array (208)	The data flag incicates the quality fo data. If values are larger than zero, the data quality is good. If values are less than zero, the data quality is bad and the specific value is used to indicate various error conditions.

rainFlag	1-byte integer Array (208)	The rain flag indicates if rain is present. If rain is possible, the value will be larger than aero. The value will be less than zero if the pixel is pre-screened as non-raining; the exact value is used to identify the screen itself.
surfaceFlag	1-byte integer Array (208)	The surface flag indicates the type of surface and has the following values: Value Meaning ----- ------- 0 ocean 1 land 2 coast 3 other
surfaceRain	4-byte float Array (208)	The surface rain is the instantaneous rain rate (mm h^-1) at the surface for each pixel. Range is (0.0, 3000.0 mm h^-1).
confidence	4-byte float Array (208)	The Confidence is that associated with the surface rain. Range is (0.0, 3000.0 mm^-h).
cldWater	4-byte float 2-D Array (14 x 208)	The cloud liquid water content ranges from 0.00 to 10.00 g m^-3.
precipWater	4-byte float 2-D Array (14 x 208)	This is the precipitation water content (g m^-3) for each pixel at 14 layers. Range is (0.00, 10.00).
cldIce	4-byte float 2-D Array (14 x 208)	The cloud ice content ranges from 0.00 to 10.00 g cm^-3. It is multiplied by 100 and stored as an integer.
precipIce	4-byte float 2-D Array (14 x 208)	This is the precipition content (g m^-3) for each pixel at 14 layers. Range is 0.00 to 10.0 g m^-3.
latentHeat	4-byte integer (14 x 208)	This is the latent heating release (deg C/day) for each pixel at 14 layers.

L3A_11_PLANETGRID

Name	Format	Description
gridStruct	5000-byte character	GridStructure gives the specification of the geometry of the grids. See Section 2 in Volume 3 of the ICS, Level 1 File Specification.
monthRain	4-byte float 2-D Array (16 x 72)	The Monthly Rainfall is that over oceans in (5 degree) x (5 degree) boxes from 40 degree N to 40 degree S. It ranges from 0.0 to 3000.0 mm. Data on land areas are assigned the value -9999.
noOfSamples	2-byte integer 2-D Array (16 x 72)	The Number of Samples is that over oceans in (5 degree) x (5 degree) boxes for one month. Ranges are TBD. Data on land areas are assigned the value of -9999.
chiSqFit	2-byte integer 2-D Array (16 x 72)	The Chi Square Fit indicates how well the histogram of brightness temperature fits the lognormal distribution function in (5 degree) x (5 degree) boxes for one month. It ranges from 1 to 5000. Data on land areas are assigned the value -9999.
freezLevel	4-byte float 2-D Array (16 x 72)	The Freezing Level is the estimated height of 0 degree isothermal in (5 degree) x (5 degree) boxes for one month. It ranges from 0.00 to 6.00 km. Data on land areas are assigned the value -9999.
T0	4-byte float 2-D Array (16 x 72)	The T0 is the mean of non-raining brightness temperatures over oceans in (5 degree) x (5 degree) boxes for one month. It ranges from 160.0 to 180.0 K. Data on land areas are assigned the value -9999.
r0	4-byte float 2-D Array (16 x 72)	The r0 is the logarithmic mean rain rate in (5 degree) x (5 degree) boxes for one month. It ranges from 0.00 to 15.00 mm h^-1. Data on land areas are assigned the value -9999.
sigmaR	4-byte float 2-D Array (16 x 72)	The SigmaR is the standard deviation of logarithmic rain rates in (5 degree) x (5 degree) boxes for one month. It ranges from 0.00 to 1.00 mm h^-1. Data on land areas are assigned the values -9999.

probRain	4-byte float 2-D Array (16 x 72)	The Probability of Rain is that in (5 degree) x (5 degree) boxes for one month. It ranges from 0.000 to 1.000. Data on land areas are assigned the value -9999.
qInd1	2-byte integer 2-D Array (16 x 72)	TBD
qInd2	2-byte integer 2-D Array (16 x 72)	TBD
qInd3	2-byte integer 2-D Array (16 x 72)	TBD
spare	2-byte integer 2-D Array (16 x 72)	TBD

VIRS

VIRS_SCAN_STATUS

Name	Format	Description
missing	1-byte integer	Missing indicates whether the information is contained in the scan data. The values are 0 Scan data elements contains information. 1 Scan was missing in the telemetry data 2 Scan data contains no elements with rain.
validity	1-byte integer	Values: 0 - Scan completely valid. 1 - Scan completely missing. 2 - Scan partially missing. 3 - Scan invalid due to spacecraft orientation. 4 - Scan invalid due to ACS mode. 5 - Scan invalid due to yaw update status. 6 - Scan invalid due to instrument status. 255 - Scan invalid due to reasons other than above.
qac	1-byte integer	The Quality and Accounting Capsule of the Science packet as it appears in Level-0 data. if no QAC is given in Level-0, which means no deconding errors occured, QAC in this format has a value of zero.
geoQuality	1-byte integer	TBD.
ch1Quality	1-byte integer	The Quality of Channel Data for a given channel on a given scan line is the percentage of pixels whose values are within the acceptable range listed in the Metadata.
ch2Quality	1-byte integer	See Channel 1.
ch3Quality	1-byte integer	See Channel 1.
ch4Quality	1-byte integer	See Channel 1.

ch5Quality 1-byte integer — See Channel 1.

scOrient 1-byte integer — Current Spacecraft Orientation

Value	Meaning
0	+x forward
1	-x forward
2	-y forward
3	Unknown Orientation

acsMode 1-byte integer — Current ACS Mode

Value	Meaning
0	Standby
1	Sun Acquire
2	Earth Acquire
3	Yaw Acquire
4	Nominal
5	Yaw Maneuver
6	Delta-H (Thruster)
7	Delta-V (Thruster)
8	CERES Calibration

yawUpdateS 1-byte integer — Yaw Update Status

Value	Meaning
0	Inaccurate
1	Indeterminate
2	Accurate

virsInstS 1-byte integer — VIRS Instrument Status

Value	Meaning
0	Day
1	Night
2	Monitor Scan Stability
3	Calibration mode

fractOrbitN 4-byte float — The orbit number and fractional part of the orbit at Scan Time. The orbit number will be counted from the beginning of the mission.

L1B_01_SWATHDATA

Name	Format	Description
scanTime	8-byte Float	A time associated with the scan. The exact relationship between Scan Time and the time of each IFOV is described in Section 3. Scan Time is expressed as the UTC seconds of the day.
geolocation	4-byte float 2-D Array (261 x 2)	The earth location of the center of the IFOV at the altitude of the geoid. The first deimension is latitude and longitude, in that order. The next dimensions are the pixel and scan. Values are represented as floating point decimal degrees. Off-earth is represented as less than or equal to -9999. Latitude is positive north, negative south. Longitude is positive east, negative west. A point on the 180th meridian is assigned to the western hemisphere.
scanStatus	19-byte Record	The status of eachy scan is represented in terms of quality, platform and instrument control data, and fractional orbit number. Detail of scanStatus are described in the VIRS_SCAN_STATUS section.
navigate	88-byte Record	The details of navigate are described in the VIRS_NAVIGATION section.
calCounts	2-byte integer 3-D Array (3 x 2 x 5)	Raw calibration counts are given in four dimensions. The first dimension is channel number, the second dimension is data word, the third is blackbody, space view and solar diffuser, and the fourth dimension is the number of scans.
localDirection	2-byte integer 3-D Array (27 x 2 x 2)	Angles to the satellite and sun from the IFOV are given in 4 dimensions. The first dimension is zenith and azimuth angles, in that order. The second dimension is the object to which the directions point, namely the satellite and the sun, in that order. The third dimension is pixel. Angles are given only for every tenth pixel along a scan: pixel 1, 11, 21, ..., and 261. For the pixel dimension, Start = 0 and Stride = -10. The fourth dimension is scan Angles and are multiplied by 100 and stored as integers.

channels	2-byte integer 2-D Array (261 x 5)	Scene data for the five channels, measured in Radiance (mW cm^-2 um^-1 sr^-1) multiplied by a scale factor and stored as integers means steradian. The scale factors are 500, 1000, 100000, 10000, and 10000 for channels 1,2,3,4 and 5, respectively. The three dimensions are channel, pixel, and scan.

L3B_42_PLANETGRID

Name	Format	Description
gridStruct	500-byte character Record	GridStructure gives the specification of the geometry of the grids. See Section 2 in Volume 3 of ICS, Level 1 File Specification.
precipitate	4-byte float 2-D Array (360 x 80)	This is the adjusted GPI precipitation estimate at each (1 degree) x (1 degree) box for 5 days. It ranges from 0.0 to 400.0 mm.
relError	4-byte float 2-D Array (360 x 80)	This is the adjusted GPI relative error at each (1 degree) x (1 degree) box for 5 days. estimate. It ranges from 0.000 to 10.000 mm. days.

L3B_43_PLANETGRID

Name	Format	Description
gridStruct	500-byte character Record	GridStructure gives the specification of the geometry of the grids. See Section 2 in Volume 3 of ICS, Level 1 File Specification.
precipitate	4-byte float 2-D Array (80 x 360)	This is the satellite/gauge precipitation estimate at each (1 degree) x (1 degree) box for 5 days. It ranges from 0.0 to 400.0 mm.
relError	4-byte float 2-D Array (80 x 360)	This is the satellite/gauge relative error estimate at each (1 degree) x (1 degree) box for 5 days. It ranges from 0.000 to 10.000 mm. days.

GV
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PARAMETER_DESCRIPTOR

Name	Format	Description
parmName	8-byte char	Name of Parameter
parmDesc	40-byte char	Description of this parameter. 8 ASCII characters.
parmUnits	8-byte char	Units for this param. 8 ASCII Chars.
interPulsePeriod	2-byte integer	Bit 0 set to 1 -> IPP #1 used Bit 1 set to 1 -> IPP #2 used Bit 2 set to 1 -> IPP #3 used Bit 3 set to 1 -> IPP #4 used Bit 4 set to 1 -> IPP #5 used
transFreq	2-byte integer	Bit 0 set to 1 -> freq 1 used Bit 1 set to 1 -> freq 2 used Bit 2 set to 1 -> freq 3 use Bit 3 set to 1 -> freq 4 used Bit 4 set to 1 -> freq 5 used
receiverBandwidth	4-byte float	Receiver bandwidth (MHz)
pulseWidth	2-byte integer	Pulse width (length) of transmitted wave (m).
polarTransWave	2-byte integer	Polarization of transmitting antenna(s) used for this parameter. 0 -- Horizontal 1 -- Vertical 2 -- Circular, Right-handed 3 -- Elliptical (specify in comment blk) 4 -- Circular, Left-handed 5 -- Dual Polarization Dual Polarization indicates that two transmitted waves of different polarization were used to measure this parameter. The polarization usedshould be implicit in the parmaeter description, e.g. Differential reflectivity.

numOfsamples	2-byte integer	Number of samples used in a single dwell time, e.g., many samples may be averaged to produce an average power for a single cell.
parmDataType	2-byte integer	Data type of parameter 1 -- 8 bit integer 2 -- 16 bit integer 3 -- 32 bit integer 4 -- floating point
thresholdField	8-byte char	Name of threshold value. This is not the name of the threshold parameter that was used to threshold these data.
thresholdValue	4-byte float	Units depend on threshld field above. The value of the parameter was set to Deleted or Missing Data Flag (below) when the threshold parameter described above takes on the threshold value or below.
scaleFactor	4-byte float	Scale factor to be used in obtaining meterological value from the data.
offsetFactor	4-byte float	Offset factor to be used in obtaining meteorological value from the data. value = (recorded value - offsetFactor)/scaleFactor
deletedOrMissDataFlag	4-byte integer	Flag for missing or deleted data -99 for 1 byte integer -9999 for 2 byte integer -9999 for 4 byte integer -9999.9 for float

CELL_RANGE_VECTOR

Name	Format	Description
numOfCells	4-byte integer	Number of cells in this cell vector
distanceToCell	4-byte float array (MAX_CELL)	Distance from radar to center of n-th cell (in m)

PARAMETER

Name	Format	Description

Name	Format	Description
parmDesc	structure	See description of PARAMETER_DESCRIPTOR.
cellRangeVector	structure	See description of CELL_RANGE_VECTOR.
parmData	2-byte integer array (MAX_CELL x MAX_RAY x MAX_SWEEP)	This array contains all lthe data for a single parameter for a single volume scan.

RADAR_DESCRIPTOR

Name	Format	Description
radarName	8-byte char	Radar Name.
radarConstant	4-byte float	Radar constant (dB). Used in the radar equation to convert power (P) to reflectivity (Z) for a given range (r). Defined here as Z = P*C*r^2 (linear)
nomPeakPower	4-byte float	Nominal peak power of transmitter (kW)
nomNoisePower	4-byte float	Nominal noise power (dBm)
receiverGain	4-byte float	Receiver gain (dB)
antennaGain	4-byte float	Antenna gain (dB). Ratio ofpower per unit area along beam axis to the isotropic radiator at same point.
radarSystemGain	4-byte float	Radar system gain (dB)
horBeamWidth	4-byte float	3 dB one-way beam width along horizontal axis (deg)
vertBeamWidth	4-byte float	3 dB one-way beam width along vertical axis (deg)
radarType	2-byte integer	Radar type: 0 -- Ground 1 -- Airborne fore 2 -- Airborne aft 3 -- Airborne tail 4 -- Airborne lower fuselage 5 -- Shipborne 6 -- Not defined 7 -- Satellite
scanMode	2-byte integer	Scan mode of Radar

		0 - Calibration 1 - PPI (Constant Elevation) 2 - Coplane 3 - RHI (Constant Azimuth) 4 - Vertical pointing 5 - Target (Stationary) 6 - Manual 7 - Idle (out of control) 8 - Surveillance 9 - Vertical sweep (Aircraft only, rotation axis parallels the fuselage)
nomScanRate	4-byte float	Nominal scan rate (deg/sec). The meaning of this and the following two angles depends on the scan mode specified above.
nomStartAngle	4-byte float	Nominal start angle (deg)
nomStopAngle	4-byte float	Nominal stop angle (deg)
numParmDesc	2-byte integer	total number of parameter descriptors for this particular radar.
numDesc	2-byte integer	Total number of descriptors, including parameter descriptors, for this radar.
dataComp	2-byte integer	Data compression in use: 0 - No compression 1 - Data Compression Should always be 0, compression handled by HDF.
dataReductAng	2-byte integer	Data reduction algorithm in use: 0 - No reduction 1 - Data recorded between two rotation angles 2 - Data recorded between two concentric circles 3 - Data recorded between two altitudes 4 - Other type of data reduction
dataReductParm1	4-byte float	Data reduction specific parameter #1 1 - Smallest Positive Angle(deg) 2 - Inner Circle Diameter (km) 3 - Minimum Altitude (km) 4 - TBD if defined
dataReductParm2	4-byte float	Data reduction specific parameter #2 1 - Largest Positive Angle (deg) 2 - Outer Circle Diameter (km) 3 - Maximum Altitude (km) 4 - TBD if defined

radarLon	4-byte float	Radar longitude (deg). For airborne radar only this should be airport longitude.
radarLat	4-byte float	Radar Latitude (deg). For airborne radar only this should be airport latitude.
radarAlt	4-byte float	Radar altitude above mean sea level (km). For airborne radar only this should be the airport altitude.
velocity	4-byte float	Effective unambiguous velocity (m/s). Deermined by inter-pulse period and frequency.
range	4-byte float	Effective unambiguous range (km). Determined by inter-pulse period and frequency.
numTransfreqency	2-byte integer	Number of different frequencies transmitted.
numInterPulsePeriods	2-byte integer	Number of different inter-pulse periouds (IPP) transmitted
frequency1	4-byte float	Frequency # 1 (GHz). Frequncy of transmitted microwave radiation. Determines wavelength.
frequency2	4-byte float	Frequency # 2
frequency3	4-byte float	Frequency # 3
frequency4	4-byte float	Frequency # 4
frequency5	4-byte float	Frequency # 5
interPulsePeriod1	4-byte float	Inter-pulse perioud #1 (msec). Period between successive transmitted pulses, inverse of the pulse repetition frequency.
interPulsePeriod2	4-byte float	Inter-pulse perioud #2 (msec).
interPulsePeriod3	4-byte float	Inter-pulse perioud #3 (msec).
interPulsePeriod4	4-byte float	Inter-pulse perioud #4 (msec).

interPulsePeriod5 Inter-pulse perioud #5 (msec).
4-byte float

CORRECTION_FACTOR_DESCRIPTOR

Name	Format	Description
azimuth	4-byte float	Correction for azimuth. This number is added to or subtracted from the azimuth angle (deg)
elevation	4-byte float	Correction for elevation. This number is added to or subtracted from the elevation angle (deg)
rangeDelay	4-byte float	Correction for range Delay. This number is added to or subtracted from the azimuth range delay (m)
radarLon	4-byte float	Correction for radar longitude. This number is added to or subtracted from the radar longitude (deg)
radarLat	4-byte float	Correction for radar latitude. This number is added to or subtracted from the radar latitude (deg)
radarPressAlt	4-byte float	Correction for radar altitude above ground level msl. This number is added to or subtracted from the radar altitude pressure(km)
radarAltAboveGround	4-byte float	Correction for radar altitude above ground level. This number is added to or subtracted from the radar altitude (km)
radarPlatGroundSpeedEW	4-byte float	Correction for radar platform ground speed E-W. This number is added to or subtracted from the radar platform groundspeed E-W (m/s)
radarPlatGroundSpeedNS	4-byte float	Correction for radar platform ground speed N-S. This number is added to or subtracted from the radar platform groundspeed N-S (m/s)

radarPlatVerticalVelocity	4-byte float	Correction for radar platform vertical velocity. This number is added to or subtracted from the radar platform vertical velocity (m/s)
radarPlatHeading	4-byte float	Correction for radar platform heading. This number is added to or subtracted from the radar platform heading (deg)
radarPlatRoll	4-byte float	Correction for radar platform roll. This number is added to or subtracted from the radar platform roll (deg)
radarPlatPitch	4-byte float	Correction for radar platform pitch. This number is added to or subtracted from the radar platform pitch (deg)
radarPlatDrift	4-byte float	Correction for radar platform drift. This number is added to or subtracted from the radar platform drift (deg)
radarRotAngle	4-byte float	Correction for radar rotation angle. This number is added to or subtracted from the radar rotation angle (deg)
radarTiltAngle	4-byte float	Correction for radar tilt angle. This number is added to or subtracted from the radar tilt angle (deg)

SWEEP_INFO

Name	Format	Descripton
radarName	8-byte char	Name of radar. As in DORADE, the field is repeated here.
sweepNum	4-byte integer	Sweep number of this volume scan. The first sweep in the volume scan is sweep 1.
numRays	4-byte integer	Number of rays in this sweep.
trueStartAngle	4-byte float	Angle of instantaneous field of view at start of sweep (deg)
trueStopAngle	4-byte float	Angle of instantaneous field of view at end of sweep (deg)

fixedAngle	4-byte float	The constant angle of this sweep (deg) PPI: angle is elevation. RHI: angle is azimuth, etc.
filterFlag	4-byte integer	Filter flag: 0 - No filtering 1 - Filter in use (description of filter placed in comment block.

SENSORS

Name	Format	Description
radarDesc	136-byte record	Details are in the RADAR_DESCRIPTOR section.
corrFactorDesc	64-byte record	Details are in the CORRECTION_FACTOR_DESCRIPTOR section.
sweepInfo	32-byte record	Details are in the SWEEP_INFO section.

rayInfoInteger	4-byte integer array (7 x MAX_RAY x MAX_SWEEP)	Entry	Description
		1	Number of the sweep that contains this ray
		2	Julian day for this ray
		3	Hour of day for this ray (UTC)
		4	Minute for this ray
		5	second for this ray
		6	millisecond for this ray
		7	Status of current ray 0 - normal 1 - Transition (antenna repositioning) 2 - Bad 3 - Questionable

rayInfoFloat	4-byte float array (4 x MAX_RAY x MAX_SWEEP)	Entry	Description
		1	Azimuth angle for this ray (deg)
		2	Elevation angle for this ray (deg)
		3	Average peak transmitted power for this ray
		4	True scan rate of radar for this ray (deg/s)

platformInfo	4-byte float array (18 x MAX_RAY x MAX_SWEEP)	Entry	Description
		1	Radar longitude (deg) (-180, 180)
		2	Radar Latitude (deg)
		3	Radar pressure altitude, msl (km)
		4	Radar alt above grnd, agl (km)
		5	Platform grnd speed E-W (m/s)
		6	Platform grnd speed N-S (m/s)

		7 Platform vert. velocity (m/s) 8 Platform heading (deg) 9 Platform roll (deg) 10 Platform pitch (deg) 11 Platform drift (deg) 12 Radar rotation angle (deg) 13 Radar tilt angle (deg) 14 Horiz. wind speed at radar E-W (m/s) 15 Horiz. wind speed at radar N-S (m/s) 16 Vert wind speed at radar (m/s) 17 Heading change rate (deg/s) 18 Pitch change rate (deg/s)
parm	array of structures (MAX_PARM)	See PARAMETER data structure.

VOLUME_DESCRIPTORS

Name	Format	Description
verNum	2-byte integer	Version number of DORADE specifications used. Currently 1.
volNum	2-byte integer	Number of this volume scan in granule.
sizeDataRec	4-byte integer	Maximum size of a DORADE data record in this VOS: 2-bytes x MAX_CELL
projectName	20-byte char	Project name, e.g. TRMM GV
year	2-byte integer	Year of the beginning of this volume scan (UTC).
month	2-byte integer	Month of beginning of volume scan (UTC)
day	2-byte integer	day
hour	2-byte integer	hour
minute	2-byte integer	minute
second	2-byte integer	second
flightNum	8-byte char	Flightnumber or IOP (Intense Observation Period) number.
genYear	2-byte integer	Year when this volume was generated
genMonth	2-byte integer	Month when this volume was generated

genDay	2-byte integer	Day when this volume was generated
numSensorDesc	2-byte integer	Number of sensor descriptors that are in this particular volume scan.

L1B_1C_GV

Name	Format	Description
comments	5000-byte char	Comments
volDes	structure	See the description of VOLUME_DESCRIPTORS
sensor	structure	See the description of SENSORS.

RAIN_PERCENT

Name	Format	Description
rainPercent	2-byte integer	The Rain Percent is rain fraction x 100.0. The rain fraction is the number of raining pixel 150 km of the radar (ie., those above an input dBz threshold, e.g. 15 dBz) in the Cartesian base scan divided by the total number of pixels within 150 km of the radar in the Cartesian base scan. The rain percent range from 0.00 to 100.00 and is mul;tiplied by 100 and stored as an integer.

L2A_53_SINGLE_RADARGRID

Name	Format	Description
tktime	3-byte Record	The fields of this record are described above in TIME_STR.
rainRate	4-byte float 2-D Array	The Rain Rate at the base scan. The rain rate ranges from 0.0 to 1000.0 mm h^-1.

L2A_53_MULT_TX_RADARGRID

Name	Format	Description
tktime	3-byte Record	The fields of this record are described above in TIME_STR.
rainRate	4-byte float 2-D Array (285x363)	The Rain Rate at the base scan. The rain rate ranges from 0.0 to 1000.0 mm h^-1.

L2A_53_MULT_FL_RADARGRID

Name	Format	Description
tktime	3-byte Record	The fields of this record are described above in TIME_STR.
rainRate	4-byte float 2-D Array (353x257)	The Rain Rate at the base scan. The rain rate ranges from 0.0 to 1000.0 mm h^-1.

L2A_54_SINGLE_RADARGRID

Name	Format	Description
time	3-byte Record	The fields of this record are described above in TIME_STR.
convStratFlag	1-byte integer 2-D Array	The convective/stratiform flag is an instantaneous map in Cartesian coordinates Each value represents the rain type of the entire vertical column. The following values are assigned for the Convective/Stratiform Flag:

Value	Meaning
0	no echo
1	stratiform
2	convective
-99	missing data

L2A_54_MULT_TX_RADARGRID

Name	Format	Description
time	3-byte Record	The fields of this record are described above in TIME_STR.
convStratFlag	1-byte integer 2-D Array (285x363)	The convective/stratiform flag is an instantaneous map in Cartesian coordinates. Each value represents the rain type of the entire vertical column. The following values are assigned for the Convective/Stratiform Flag: Value Meaning 0 no echo 1 stratiform 2 convective -99 missing data

L2A_54_MULT_FL_RADARGRID

Name	Format	Description
time	3-byte Record	The fields of this record are described above in TIME_STR.
convStratFlag	1-byte integer 2-D Array (353x257)	The convective/stratiform flag is an instantaneous map in Cartesian coordinates. Each value represents the rain type of the entire vertical column. The following values are assigned for the Convective/Stratiform Flag: Value Meaning 0 no echo 1 stratiform 2 convective -99 missing data

L2A_55_SINGLE_RADARGRID

Name	Format	Description
time	3-byte	The fields of this record are described

	Record	above in TIME_STR.
threeDreflect	4-byte float 3-D Array (13x151x151)	The 3-D Reflectivity is the instantaneous reflecitivity interpolated from volume scans onto a 3-D Cartesian coordinate system with 1.5 km vertical resolution with varied covering ranges from single radar sites to muliple radar sites. For single sites the horizontal area is 300km x 300km. At multiple sites in Texas the area is 724km x 568km, while in Florida it is 512km x 704km. Values range from -15.0 to 70.0 dBZ.
vertProfile	4-byte float 2-D Array (13 x 12)	The verticle profiles include reflectivity at each of the nz analysis level for the following categories: Value Meaning ----- ------- 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea
cfadData	4-byte integer 3-D Array (13 x 86 x 12)	The CFAD Data is the number of pixels counted in specified height-reflectivity bin pairs for the 12 categories listed below for each volume of radar data. Values range from 0 to 22801 (151 x 151) for single radar sites and from 0 to 103,455 (363x285) for Texas multiple radar site, and 0 to 90,721 (257 x 353) for Florida multiple radar site. The 12 categories are: Value Meaning ----- ------- 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform

		8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea

L2A_55_MULT_TX_RADARGRID

Name	Format	Description
time	3-byte Record	The fields of this record are described above in TIME_STR.
threeDreflect	4-byte float 3-D Array (13x285x363)	The 3-D Reflectivity is the instantaneous reflecitivity interpolated from volume scans onto a 3-D Cartesian coordinate system with 1.5 km vertical resolution with varied covering ranges from single radar sites to muliple radar sites. For single sites the horizontal area is 300km x 300km. At multiple sites in Texas the area is 724km x 568km, while in Florida it is 512km x 704km. Values range from -15.0 to 70.0 dBZ.
vertProfile	4-byte float 2-D Array (13 x 12)	The verticle profiles include reflectivity at each of the nz analysis level for the following categories: Value Meaning 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea
cfadData	4-byte integer 3-D Array (13 x 86 x 12)	The CFAD Data is the number of pixels counted in specified height-reflectivity bin pairs for the 12 categories listed below for each volume of radar data. Values range from 0 to 22801 (151 x 151) for single radar sites and from 0 to 103,455 (363x285) for Texas multiple radar

site, and 0 to 90,721 (257 x 353) for Florida multiple radar site. The 12 categories are:

Value	Meaning
1	total
2	total over land
3	total over sea
4	convective
5	convective over land
6	convective over sea
7	stratiform
8	stratiform over land
9	stratiform over sea
10	anvil (Anvil is defined as echo with no contribution to surface rain.)
11	anvil over land
12	anvil over sea

L2A_55_MULT_FL_RADARGRID

Name	Format	Description
time	3-byte Record	The fields of this record are described above in TIME_STR.
threeDreflect	4-byte float 3-D Array (13x353x257)	The 3-D Reflectivity is the instantaneous reflecitivity interpolated from volume scans onto a 3-D Cartesian coordinate system with 1.5 km vertical resolution with varied covering ranges from single radar sites to muliple radar sites. For single sites the horizontal area is 300km x 300km. At multiple sites in Texas the area is 724km x 568km, while in Florida it is 512km x 704km. Values range from -15.0 to 70.0 dBZ.
vertProfile	4-byte float 2-D Array (13 x 12)	The verticle profiles include reflectivity at each of the nz analysis level for the following categories:

Value	Meaning
1	total
2	total over land
3	total over sea
4	convective
5	convective over land
6	convective over sea

		7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea
cfadData	4-byte integer 3-D Array (13 x 86 x 12)	The CFAD Data is the number of pixels counted in specified height-reflectivity bin pairs for the 12 categories listed below for each volume of radar data. Values range from 0 to 22801 (151 x 151) for single radar sites and from 0 to 103,455 (363x285) for Texas multiple radar site, and 0 to 90,721 (257 x 353) for Florida multiple radar site. The 12 categories are: Value Meaning ----- ------- 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea

L3A_53_SINGLE_RADARGRID

Name	Format	Description
pentadRainfall	2-byte integer 2-D Array	Pentad Rainfall is a map of the 5-day rainfall total as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution. They cover a region of 300km x 300km at single sites, 724km x 568km at Texas site and 512km x 704km at Florida site. As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the geps is still TBD. The rainfall ranges from 0.00 to 5,000.0 mm.

L3A_53_MULT_TX_RADARGRID

Name	Format	Description
pentadRainfall	2-byte integer 2-D Array (285x363)	Pentad Rainfall is a map of the 5-day rainfall total as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution. They cover a region of 300km x 300km at single sites, 724km x 568km at Texas site and 512km x 704km at Florida site. As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the geps is still TBD. The rainfall ranges from 0.00 to 5,000.0 mm.

L3A_53_MULT_FL_RADARGRID

Name	Format	Description
pentadRainfall	2-byte integer 2-D Array (353x257)	Pentad Rainfall is a map of the 5-day rainfall total as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution. They cover a region of 300km x 300km at single sites, 724km x 568km at Texas site and 512km x 704km at Florida site. As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the geps is still TBD. The rainfall ranges from 0.00 to 5,000.0 mm.

L3A_54_SINGLE_RADARGRID

Name	Format	Description
monthlyRain-fall	2-byte integer 2-D Array	Monthly Rainfall is a map monthly rainfall totals as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution, and cover an area of 300km x 300km at single sites, 724km x 568km at Texas, 512km x 704km at Florida multiple radar site.

		As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the gaps is still TBD. The rainfall ranges from 0.0 to 6,400.0 mm.

L3A_54_MULT_TX_RADARGRID

Name	Format	Description
monthlyRainfall	2-byte integer 2-D Array (285x363)	Monthly Rainfall is a map monthly rainfall totals as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution, and cover an area of 300km x 300km at single sites, 724km x 568km at Texas, 512km x 704km at Florida multiple radar site. As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the gaps is still TBD. The rainfall ranges from 0.0 to 6,400.0 mm.

L3A_54_MULT_FL_RADARGRID

Name	Format	Description
monthlyRainfall	2-byte integer 2-D Array (353x257)	Monthly Rainfall is a map monthly rainfall totals as derived from the instantaneous rain rate maps. The maps are in Cartesian coordinates with 2 km horizontal resolution, and cover an area of 300km x 300km at single sites, 724km x 568km at Texas, 512km x 704km at Florida multiple radar site. As mentioned previously, this is not a simple accumulation of the instantaneous maps due to the presence of gaps in the data. The method used to handle the gaps is still TBD. The rainfall ranges from 0.0 to 6,400.0 mm.

L3A_55_RADARGRID

Name	Format	Description

vertProfile	4-byte float 2-D Array (13 x 12)	The verticle profiles are computed at each analysis level for a month for the following categories: Value Meaning ----- ------- 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea
cfadData	4-byte integer 3-D Array (13 x 86 x 12)	The CFAD Data is the Contoured Frequency by Altitude. Diagram data, which is the number of pixels counted in specified height-reflectivity bin pairs for the 12 categories listed below for a month of radar data. Values range from 0 to 68,403,000 (approximately 3000 radar values/month x 151 x 151) for single radar sites and from 0 to 310,365,000 (3000 x 363 x 285) for multiple radar sites. The 12 categories are: Value Meaning ----- ------- 1 total 2 total over land 3 total over sea 4 convective 5 convective over land 6 convective over sea 7 stratiform 8 stratiform over land 9 stratiform over sea 10 anvil (Anvil is defined as echo with no contribution to surface rain.) 11 anvil over land 12 anvil over sea

L3A_46_PlanetGrid

Name	Format	Description
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gridStruct	record	fields of this record are described above in GRIDSTRUCT
dailyRainfall	2-byte integer 2 D array (720x160)	The daily rainfall is that in 0.5degree x 0.5degree grid boxes calculated from SSM/I L-1B data. Ranges are to be declared